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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/533,449	05/02/2005	Atsushi Kaneda	123699	1816

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EXAMINER	
GUGLIOTTA, NICOLE T	
ART UNIT	PAPER NUMBER
1794	
MAIL DATE	DELIVERY MODE
09/01/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/533,449	KANEDA ET AL.	
	Examiner	Art Unit	
	NICOLE T. GUGLIOTTA	1794	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 June 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,4,6,8,24 and 25* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,4,6,8,24 and 25* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on June 3, 2009 has been entered.

Examiner's Note

Examiner acknowledges the amendment to claim 1, the cancellation of claim 5, as well as the addition of claims 24 and 25. Examiner confirms no new matter has been added.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1. Claims 1, 4, 6, 8, 24, and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishihara et al. (EP 1251247 A1, provided by Applicants), as evidenced by Shaffer (U.S. Patent No. 4,904,625), in view of Hamanaka et al. (WO 2002/074417).

Note: US 2003/0140608 is the national stage application for WO 2002/074417, and has been cited below as the English language equivalent.

In regard to claims 1, 4, 24 & 25, Ishihara et al. disclose a porous diesel exhaust filter molded into the form of a honeycomb, wherein the porosity of the cells walls is 55% and the porosity of the plugs are 70% (Table 1, Samples 7 - 9 and 13- 15). Ishihara et al. disclose the plugs and walls were made of the same porous material (¶ [0035]). Shaffer teaches the lower density (i.e. higher porosity) of a ceramic material contributes to a lower Young's Modulus and a higher thermal shock resistance (Col. 3, Lines 46 – 48). Therefore, it stands to reason when the porosity of the plugging material is higher than that of the cell walls; the Young's Modulus of the plugging material is lower than that of the cell walls, such as in the honeycomb disclosed by Ishihara et al.

Ishihara et al. is silent in regard to the presence of silicon carbide in their honeycomb structure and the thickness of the cell walls. However, Hamanaka et al. disclose plugged (¶ [0027]) ceramic honeycombs are preferably made of silicon carbide, or silicon carbide and metallic silicon, because these materials are superior in heat resistance and thermal conduction (¶ [0031]). In regard to the plugging material, Hamanaka et al. disclose the dried honeycomb member is comprised of the extruded honeycomb member and the plugging material (¶ [0066]), and the ceramics are made of preferably metallic silicon and silicon carbide ([0032]). Therefore, it would be reasonable to believe the cells walls and the plugging material were both made of the same metallic silicon and silicon carbide composition. In addition, Hamanaka et al. teach the cell walls have

thickness of 0.3 mm (300 μm)(¶ [0065]). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to substitute silicon carbide, or silicon carbide and metallic silicon, as the materials of choice in a honeycomb used as a diesel exhaust filter because of its superior heat resistance and thermal conduction, as taught by Hamanaka et al.

In regard to claim 6, Ishihara et al. disclose the honeycomb structure to be made from a ceramic material (¶ [0028]), with cells walls of 55% porosity (¶ [0031]).

In regard to claim 8, Ishihara et al. disclose the cordierite material is placed at the end of selected cells so as to form the plugs. The plugs were arranged in checker work pattern (¶ [0029]). In addition, Hamanaka et al. disclose plugged cells (¶ [0027]).

2. Claims 1, 4, 6, 8, 24 & 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ichikawa et al. (U.S. Patent No. 5,595,581), as evidenced by Shaffer (U.S. Patent No. 4,904,625), in view of Hamanaka et al. (WO 2002/074417).

Note: US 2003/0140608 is the national stage application for WO 2002/074417, and has been cited below as the English language equivalent.

In regard to claims 1, 24 & 25, Ichikawa et al. disclose a honeycomb exhaust filter in which the porosity of the sealing members (corresponds to Applicants' "plugging material") of the exhaust gas filters is desired to be 110 – 140% of the porosity of the above honeycomb structure (corresponds to

Applicants' "cell wall"), for maintaining a high collection efficiency and decreasing pressure losses (Col. 2, Lines 31 – 36). Shaffer teaches the lower density (i.e. higher porosity) of a ceramic material contributes to a lower Young's Modulus and a higher thermal shock resistance (Col. 3, Lines 46 – 48). Therefore, it stands to reason when the porosity of the plugging material is higher than that of the cell walls; the Young's Modulus of the plugging material is lower than that of the cell walls, such as in the honeycomb disclosed by Ishikawa et al.

Ishikawa et al. disclose the sealer of the sealing members of ceramic fibers, cordierite particles, LAS (lithium aluminosilicate) may be employed (Col. 6, Lines 21 - 24). Ishikawa et al. is silent in regard to the use of silicon carbide in the sealing members or ceramic members. However, Hamanaka et al. disclose plugged (¶ [0027]) ceramic honeycombs are preferably made of silicon carbide, or silicon carbide and metallic silicon because these materials are superior in heat resistance and thermal conduction (¶ [0031]). In regard to the plugging material, Hamanaka et al. disclose the dried honeycomb member is comprised of the extruded honeycomb member and the plugging material (¶ [0066]), and the ceramics are made of preferably metallic silicon and silicon carbide ([0032]). Therefore, it would be reasonable to believe the cells walls and the plugging material were both made of the same metallic silicon and silicon carbide composition. In addition, Hamanaka et al. teach the cell walls have thickness of 0.3 mm (300 μm)(¶ [0065]). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to substitute silicon carbide and metallic silicon as the material of choice in a honeycomb used as a diesel

exhaust filter because of its superior heat resistance and thermal conduction, as taught by Hamanaka et al.

In regard to claims 4 and 6, Ichikawa et al. disclose a porous cylindrical honeycomb structure with 45% porosity. Examiner places the burden upon the Applicant to demonstrate there is a patentable difference between 45% and 46% porosity for the cell walls.

In regard to claim 8, Ichikawa et al. disclose cells that are plugged in an alternating manner so as to form checkerboard patterns at the end faces (Figures 1 - 3). In addition, Hamanaka et al. disclose plugged cells (¶ [0027]).

3. Claims 1, 4, 6, 8, 24 & 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hijikata (WO 2002/081880), as evidenced by Shaffer (U.S. Patent No. 4,904,625), in view of Ichikawa et al. (U.S. Patent No. 5,595,581).

Note: US 2004/0101654 A1 is the national stage application for WO 2002/081880, and has been cited below as the English language equivalent.

In regard to claims 1, 24 and 25, Hijikata discloses a honeycomb assembly made of silicon carbide powder. The cell wall thicknesses are 0.38 mm (380 μm) (inside) and 0.25 mm (250 μm)(outside) (Example 1). Hijikata further teaches same material used for the honeycomb segments should be used for the plugging material (Col. 8, Lines 13 - 15). Hijikata is silent in regard to the the Young's modulus and porosity of the plugging material relative to the cell walls.

Ichikawa et al. disclose a honeycomb exhaust filter in which the porosity of the sealing members (corresponds to Applicants' "plugging material") of the exhaust gas filters is desired to be 110 – 140% of the porosity of the above honeycomb structure (corresponds to Applicants' "cell wall"), for maintaining a high collection efficiency and decreasing pressure losses (Col. 2, Lines 31 – 36). Shaffer teaches the lower density (i.e. higher porosity) of a ceramic material contributes to a lower Young's Modulus and a higher thermal shock resistance (Col. 3, Lines 46 – 48). Therefore, it stands to reason when the porosity of the plugging material is higher than that of the cell walls; the Young's Modulus of the plugging material is lower than that of the cell walls, such as in the honeycomb disclosed by Ishikawa et al. It would have been obvious to one of ordinary skill in the art at the time of the invention to adjust in the honeycomb disclosed by Hijikata the porosity of the plugging material to be 110 - 140% of the porosity of the cell walls (honeycomb structure) in order to maintain high collection efficiency and decrease pressure losses.

In regard to claims 4 and 6, Ichikawa et al. disclose a porous cylindrical honeycomb structure with 45% porosity. Examiner places the burden upon the Applicant to demonstrate there is a patentable difference between 45% and 46% porosity for the cell walls.

In regard to claim 8, Hijikata discloses the ends of the cells were alternately plugged, such that each end face looked like a checkerboard pattern (Col. 8, Lines 56 - 59).

Response to Arguments

4. Applicants argue, "...there is no teaching or suggestion in Stobbe that the above-mentioned advantages of SiC (noted by the Office Action) could or would be obtained under circumstances where a pure or almost entirely SiC honeycomb structure is not present. Therefore, in order to obtain the advantages set forth in Stobbe one of ordinary skill in the art would need to produce a filter body of substantially pure SiC" (Remarks, Pg 5).

EXAMINER'S RESPONSE: The Examiner was not suggesting otherwise. When Examiner suggested substituting the SiC taught by Stobbe for the cordierite taught by the primary reference, the suggestion was for a *complete* substitution - cells walls, plugging material, etc. However, considering Examiner has withdrawn the Stobbe reference due to Applicants' arguments over the cell wall thickness, Examiner considers this argument moot.

5. Applicants argue, "...the applied references fail to establish that there would have been a reasonable expectation of successfully achieving a honeycomb structure wherein the plugging material comprises silicon carbide and the thickness of the cell wall is 400 μm or less, as required by amended claim 1" (Remarks, Pg 6).

EXAMINER'S RESPONSE: Applicant's arguments, see Remarks, filed June 3, 2009, with respect to Stobbe have been fully considered and are persuasive. The reference of Stobbe has been withdrawn. However, Hijikata discloses a honeycomb body comprising cell walls less than 400 μm, as well as

plugging material, both of which are made of silicon carbide, with no suggestion of cracks. Therefore, Examiner believes there would have been a reasonable expectation of successfully achieving a honeycomb structure wherein the plugging material comprises silicon carbide and the thickness of the cell wall (also made of silicon carbide) is 400 μm or less, as required by the amended claim 1.

6. Applicants argue, "The patentability of the current claims is also supported by unexpected results. The specification states that materials having a high strength or Young's Modulus, like silicon carbide, are discouraged because when these materials are used as the plugging material the end face of a honeycomb structure may be cracked. See specification at page 9, lines 20 - 27 and page 24, lines 24 to page 2, line 2. However, the data in Table 3, which reflects that no cracking occurs when the porosity of the SiC is increased to greater than 105%, demonstrates unexpected results. Such results are not observed or suggested in the prior art and are unexpected" (Remarks, Pg 7).

EXAMINER'S RESPONSE: Applicant's arguments, see Remarks, filed June 3, 2009, with respect to Stobbe have been fully considered and are persuasive. The reference of Stobbe has been withdrawn. However, Hijikata discloses a honeycomb body of reduced pressure comprising cell walls and plugging material, wherein the thickness of the cell walls throughout the honeycomb are less than 400 μm. Both the cell walls and plugging material are made of silicon carbide, with no indication of cracking. In addition, Ichikawa et al.

disclose increasing the porosity of the plugging material relative to the cell walls for a honeycomb in order to reduce the pressure, with no indication of cracking. Therefore, it would be reasonable to believe one could achieve a honeycomb body of reduced pressure, with no cracking, when the teachings of Ichikawa are applied to the silicon carbide body disclosed by Hijikata. Based on this reasoning, the Examiner does not believe Applicants results are unexpected.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to NICOLE T. GUGLIOTTA whose telephone number is (571)270-1552. The examiner can normally be reached on M - F 8:30 - 6 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David R. Sample can be reached on 571-272-1376. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/David R. Sample/
Supervisory Patent Examiner, Art Unit 1794

NICOLE T. GUGLIOTTA
Examiner
Art Unit 1794